

ABSTRACT

A personal communication device comprises a housing, a receiver component, a processor and a multi-functional piezoelectric transducer. The transducer is mounted within the housing, is electrically connected to the processor, and produces mechanical vibrations in response to the electrical signals transmitted by the processor. These mechanical vibrations are over a broad range of frequencies and are of a force sufficient to generate a tactile alert, an audible alert, and audible sound over the audible frequency range.

The transducer comprises a piezoelectric component and an acoustic member attached to one of the surfaces of the piezoelectric component. The piezoelectric component may comprise either an unimorph or a bimorph structure including a piezoceramic wafer made of lead zirconate titanate and a layer of dampening material sandwiched between the piezoelectric component and the acoustic member.

The acoustic member comprises a surrounding wall portion and an end portion which form an acoustic chamber when the member is mounted on a surface of the piezoelectric component. The end portion has an orifice to form a passageway from the chamber through the end portion to the outside of the member.